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IOT BASED INDUSTRIAL AUTOMATION USING RASPBERRY Pi

[1]C. Sai Venkata Sahadev, [2]G.Vara Lakshmi, [3]U.Ganesh

[1,2,3]*B.Tech (EEE) student*

[1,2,3,]*Lakireddy Bali Reddy college of Engineering, Mylavaram, India*

Sahadev213@gmail.com

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ABSTRACT

Industrial automation is very much popular now- a days as it improves profitability, safety and reliability. In industrial automation control, a wide number of process variables such as, temperature, stream, pressure, distance, and fluid levels can be detected all the while. By implementing Raspberry Pi and Embedded web server technology and utilizing local networking standards, industrial parameters can be controlled and checked distantly. It reduces designing expenses regarding manual arrangements of all involved gadgets. In this project, a system is created which will monitor automatically the industrial applications, the temperature, humidity, gas leakages.Camera is utilized for identifying and alerting from undesirable activities or unauthorized persons including in surrounded region of industry. In the proposed system raspberry pi is utilized as controller and server, python language is utilized to run the prototype. The Raspberry pi communicates with the Embedded Web Server. When the information is associated with the web server, it will store and give the information at required time. PuTTY software are utilized for checking and controlling the industrial parameters.

Keywords: **Automation, Raspberry Pi, PuTTY, Thingspeak software.**

I. INTRODUCTION

Industrial automation involves different sorts of control systems, e.g., motion control, protection systems, and advanced control. The approach might be (i) a group cycle in which the item is made stage by stage over a series of workstations, e.g., drug, food and beverages industries; (ii) continuous cycle in which the materials are handled continuously without interruption, e.g., electric force, oil and gas, mining and metals, pulp and paper enterprises; and (iii) discrete assembling, which is characterized by separate unit production and requires producing floor space to work off requests to build something, e.g., vehicles and industrial robots [1]. Automation offers better help to the customers by eliminating the work by human and accomplish accuracy and speed in work.

PC-based automation for industries consumes huge power and involves huge zone. This limitation can be overcome by using Raspberry Pi. The Raspberry Pi is a credit-card small scale PC which utilizes Linux operating system and can do almost anything like a PC [2]. It can accept accessories, for example a keyboard, mouse, screen or camera, and interface with the web. Utilizing web, the system can be effectively monitored and controlled. By utilizing IoT system, the system becomes more secured and live data monitoring is also possible [3].

Divyesh Zanzmeriya [4], have discussed that Industrial Automation System for energy with the help of Raspberry Pi programmed by Python language utilizing IoT and FIREBASE cloud computing. Prof. Niranjan M, Madhukar N, [5], have recommended that, Internet ofThings (IoT) is the best technique for industrial automation. IoT will

support information aggregation, analysis, and visualization. The IoT design comprises most recent technologies, for example, PCs, intelligent gadgets, wireless communication and cloud computing. Automation can be done through the Bluetooth, but it is limited for short distance communication. Raspberry Pi with IOT based automation is utilized in many research papers for various applications.

This project involves the design of a prototype of an Industrial automation system utilizing Raspberry Pi board and internet of things. This gives a demonstration of how to build up a remotely controlled system that can enable the person away from the industry surroundings to control the system by accessing Raspberry pi, and get the related data by SMS (short message service) on phone.

II. PROPOSED METHOD

The block diagram of IOT industrial automation utilizing Raspberry Pi project as shown in figure 1 consists of various system blocks. The power supply block converts 220V AC to 5V DC which gives power to the Raspberry Pi and the LCD. The two relays are associated to the two industrial gadgets: temperature and humidity. By switching the relays on and off, these gadgets can be turned ON or OFF.

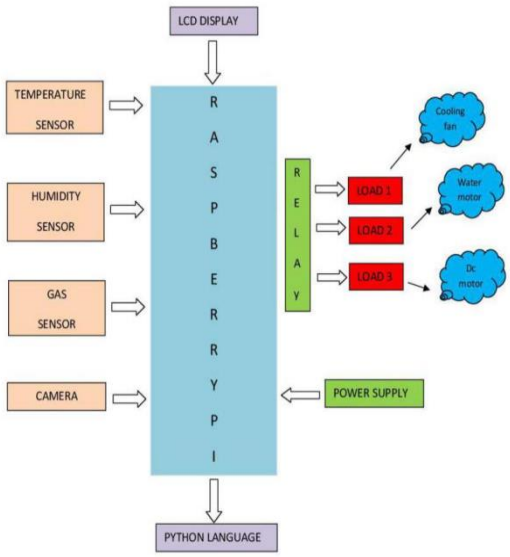

Figure 1. Block Diagram of Proposed System

The control signals of the relays are given by the Raspberry pi. A LCD display is also associated to the output of the Raspberry Pi in order to show the gadget status as well as important system messages. The Raspberry Pi single board PC is used to develop communication with the remote IOT server utilizing the IOT protocols over the Wi-Fi connection.

A. Hardware used:

1.Raspberry Pi

2.DHT11 Temperature sensor

3. Logitech webcam c 310

4.Relay module

5. Cooling fan for temperature

6. Water pump motor

7. MQ2 gas sensor

8.DCmotor

B. Software used:

Python

Putty

Fing

Thingspeak

Embedded web server

III. RESULTS

The prototype model of industrial automation is shown in figure2.

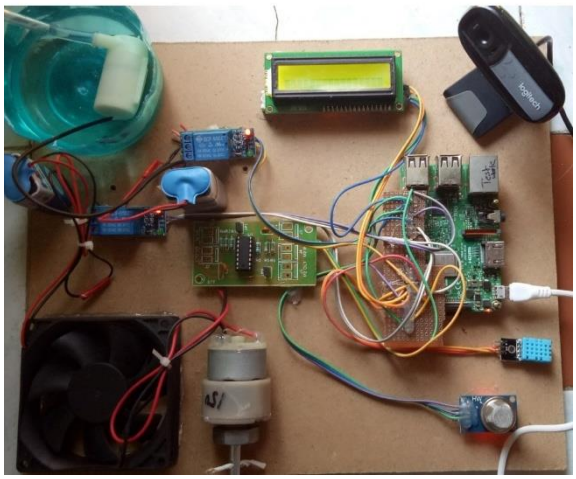

Figure 2. Hardware Model of Industrial Automation

In the proposed model, 5V DC is given to Raspberry pi. At the point when the Raspberry pi is ON, through the auxiliaries monitor and keyboard, python code is written into Rpi board by interfacing the Rpi to the PuTTY software. By interfacing the Raspberry pi to PuTTY software IP address of Raspberry pi can be find. The IP address is entered into that software. At the point when the Rpi is connected to the PuTTY software, the LCD will ON and display sensors values as shown in fig 3.

Figure 3. LCD Display

The IP address of Rpi can be known through Fing application which is installed in the mobile. The sensor values are displayed in the laptop screen when no disturbance is present is as shown figure4.

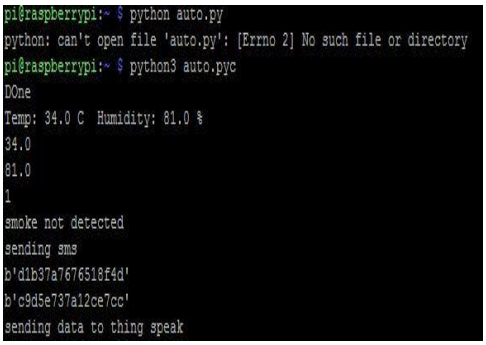

Figure 4. Sensor Values when no Disturbance Present

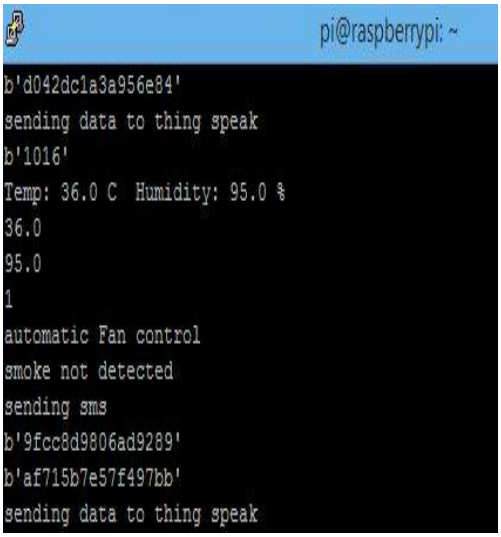

Figure 5. Temperature Sensor Data Updated in Thingspeak

At the point when fault occurred in the temperature sensor, consequently the fan will be ON and sending that information to cloud, that information will be updated in the Things view as shown in figure5.

At the point when the gas detected by the MQ2 sensor, automatically the DC motor will ON to close the gas pipe lines. That information will be displayed on laptop screen as Smoke is detected.

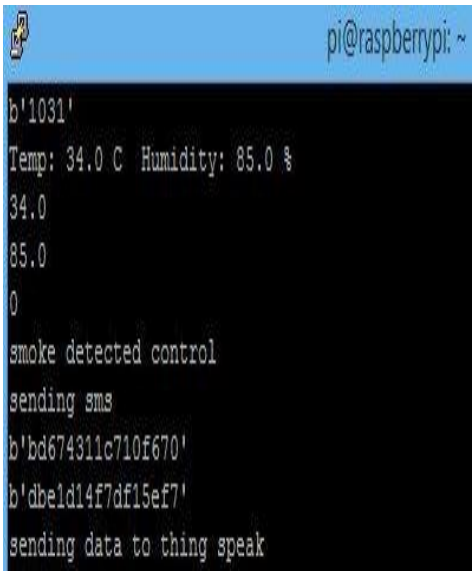

Figure 7.Message Sent to Mobile

Sensor values can be displayed in Things view as represented in figure8

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Figure 6. Smoke Detection Updated in Thingspeak

If the fault occurred in temperature, Humidity and Gas leakage sensors, at that point the SMS will be send automatically to the concerned person mobile as shown in figure7.

The Camera monitors the live situation of the surroundings near the industry to detect the suspicious moments of the industry. The camera view is represented in figure 9.

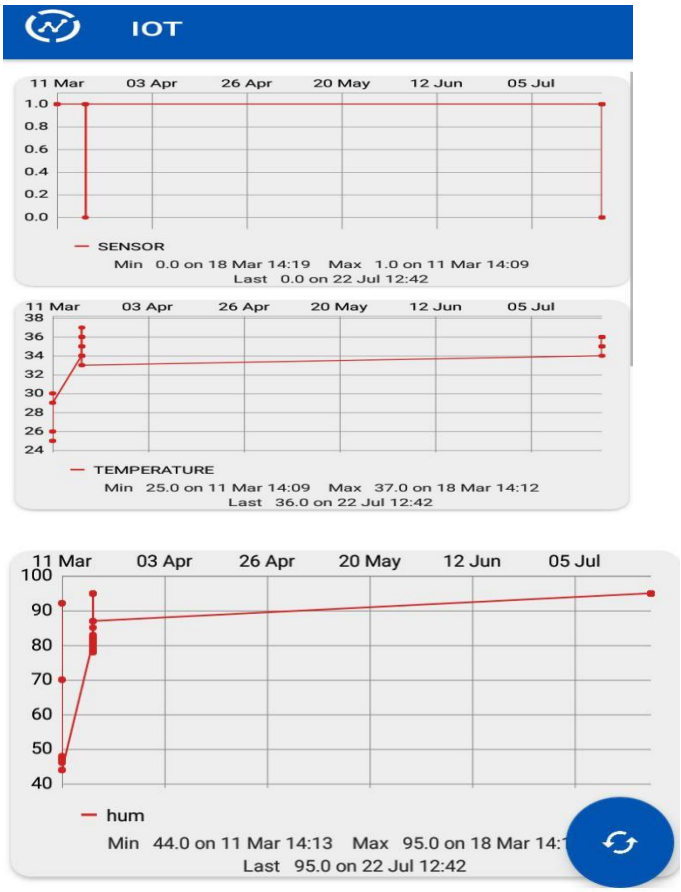

Figure 8. Plot of Sensor Values

Figure 9 Camera Live

IV. CONCLUSION

There is lot of wastage in energy at industrial work environment and the real status of the installed system may be hiding through workers. Raspberry pi is small in size and also consumes less power. It undertakes complex handling of collected information. This system minimizes the energy waste by providing sufficient data to the owner remotely and facilities appropriate decision making.

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Author Details

C.Sai Venkata Sahadev is pursuing final B.Tech in Dept.EEE in Lakireddy Bali Reddy college of Engineering, Mylavaram. His areas of interest are power electronics and automation .

G. Varalakshmi is pursuing final B.Tech in Dept.EEE in Lakireddy Bali Reddy college of Engineering, Mylavaram. Her areas of interest are power systems and automation.

U.Ganesh is pursuing final B.Tech in Dept.EEE in Lakireddy Bali Reddy college of Engineering, Mylavaram. His areas of interest are power electronics and optimization techniques.